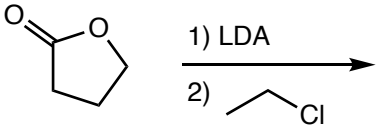
CHEM 33 PROBLEM SET 1

1. Give the missing products for the following reactions.

a.



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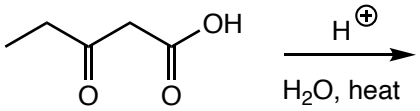

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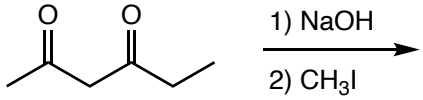

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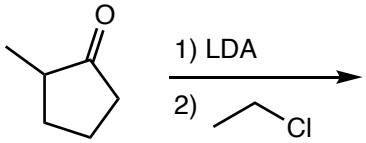

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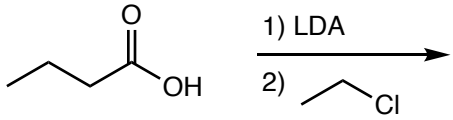

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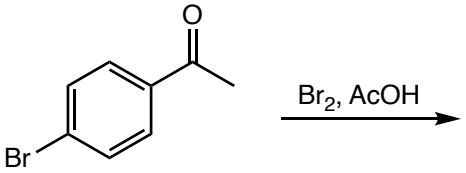

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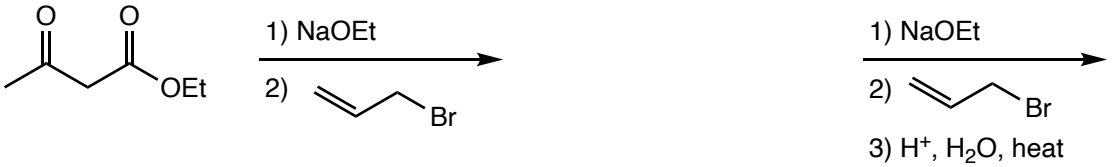

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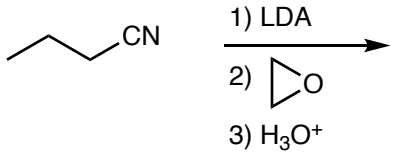
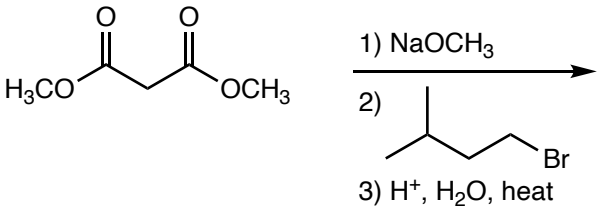


2. Give the missing products for the following reactions.

a.



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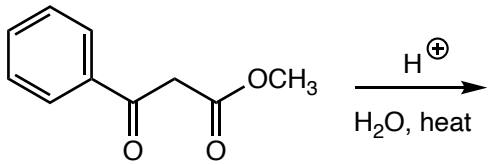

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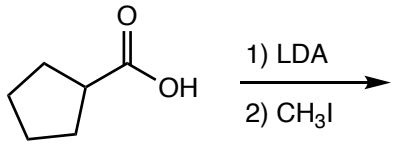

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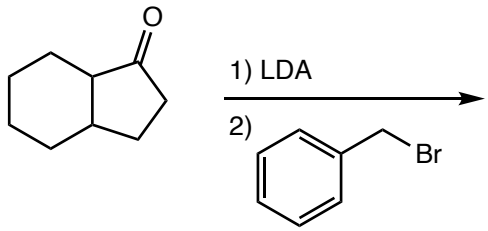
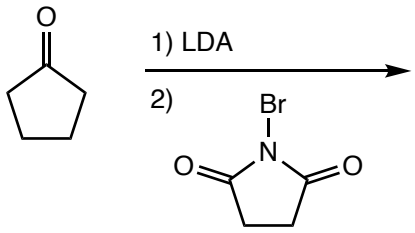


e. The reagent in step 2 is N-bromosuccinimide (NBS). Think about how it might act here.



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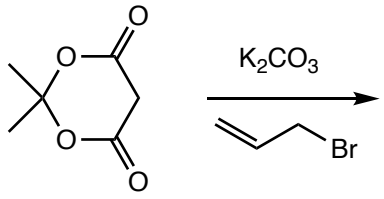

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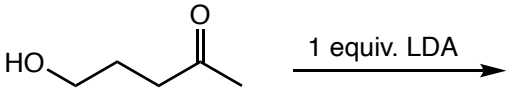
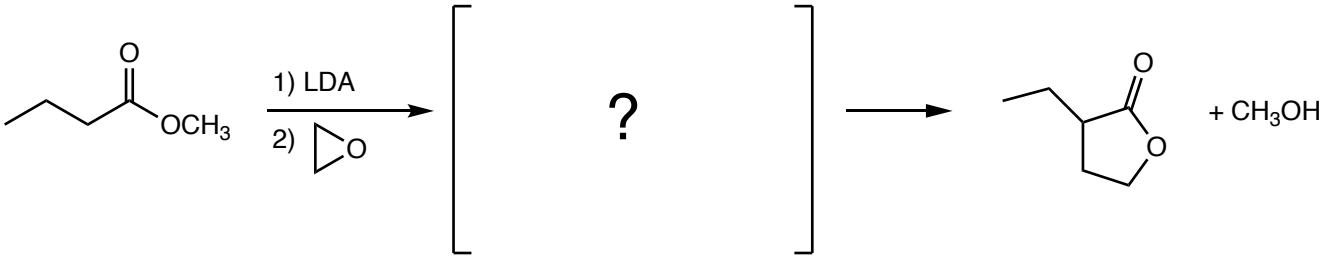
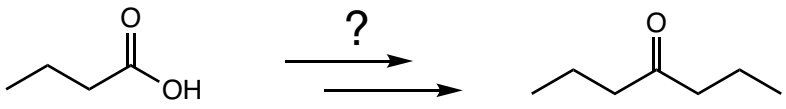


3. Predict the initial product from the following reaction, and then draw a mechanism to show the subsequent conversion of this intermediate product to the final lactone (or cyclic ester) product. The overall reaction proceeds spontaneously to the lactone, which is isolated after a typical acid/water quench.



4. Propose syntheses to accomplish the following transformations. A couple of them may take four steps, and several can be accomplished more than one way.

a.



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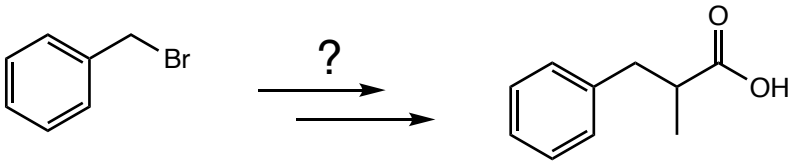

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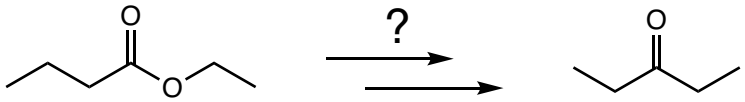

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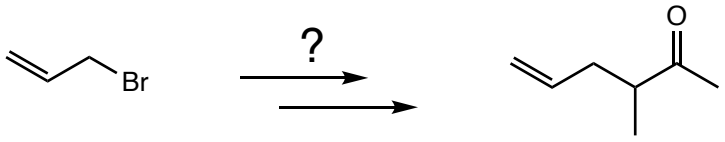

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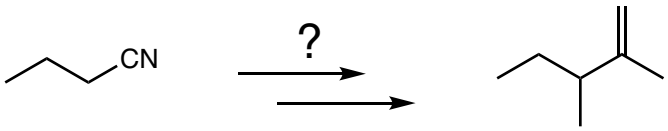
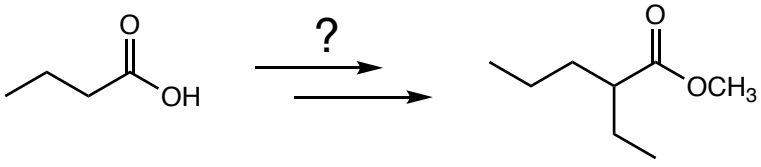


5. Propose syntheses to accomplish the following transformations. A couple of them may take four steps, and several can be accomplished more than one way.

a.



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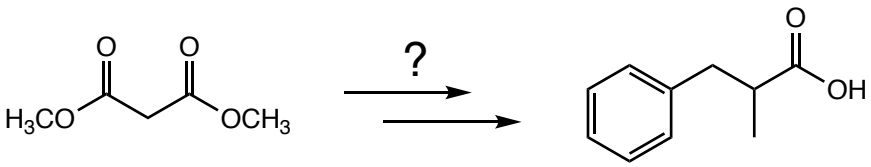

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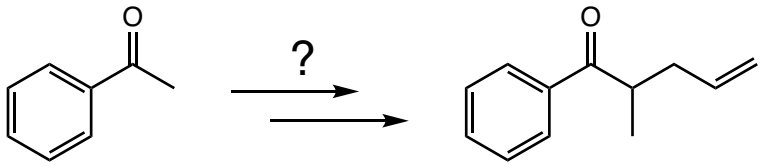

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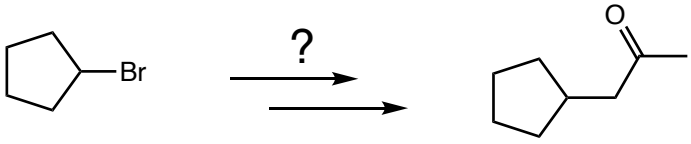

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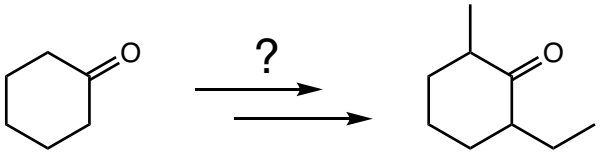

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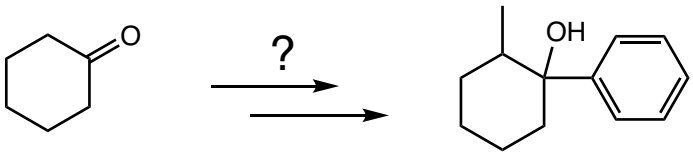
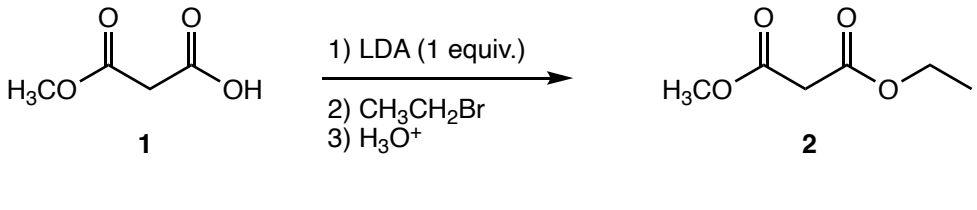
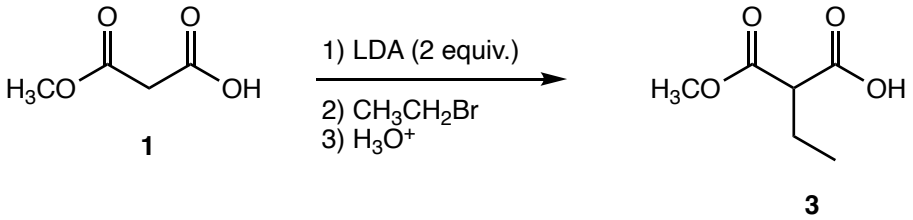
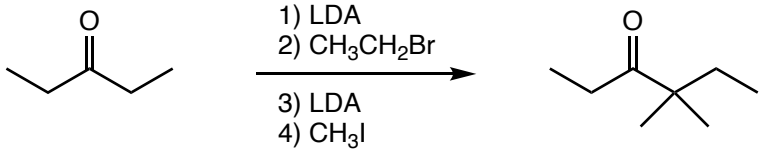


6. When compound **1** is treated with *one* equivalent of base and then one equivalent of ethyl bromide, the ethyl ester **2** is formed (top reaction). However, when **1** is treated with *two* equivalents of base and then one equivalent of ethyl bromide, the carbon-alkylated product **3** is formed (bottom reaction). Explain these results.

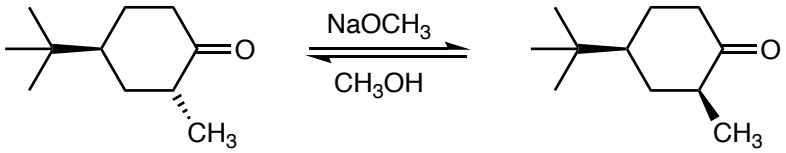




7. The reaction below shows a plausible but unlikely product. Examine it closely to determine why the product shown is not favored, then provide what should be the favored product. Briefly explain your reasoning.

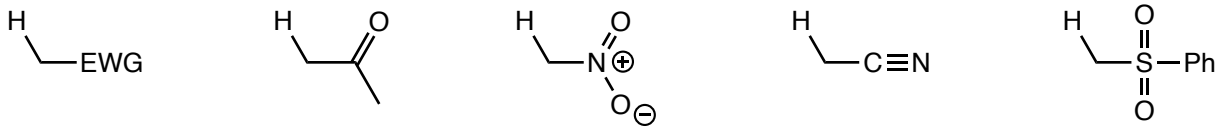


8. Draw a stepwise mechanism for the conversion of **A** to **B.** If this reaction is allowed to go for several hours, most of **A** is converted to **B**. Explain why **B** would be favored.



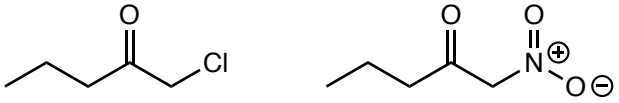
A **B**

9. The chart below gives the pKa's of the protons alpha to a variety of electron-withdrawing groups (EWGs). These pKa's provide an experimental measure of the electron withdrawing ability of the functional groups. With this data as a guide, determine which is the stronger acid in the following sets of compounds, and give a brief explanation of your reasoning. As part of your answer, clearly indicate which hydrogen in each molecule is the most acidic, and try to estimate the pKa's.



pKa	20	10	31	29

a.



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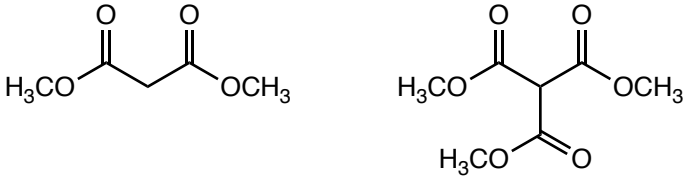

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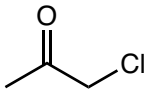

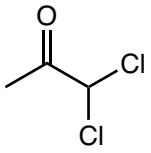

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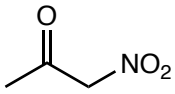

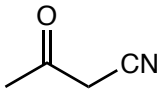

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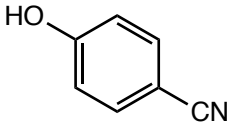

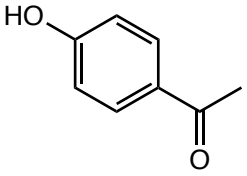

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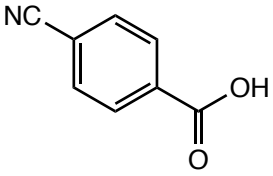
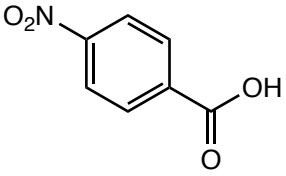
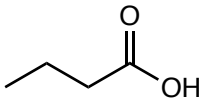
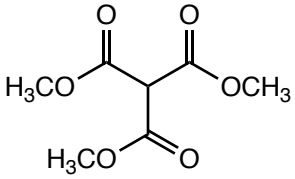
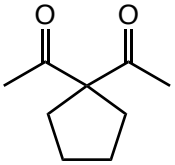


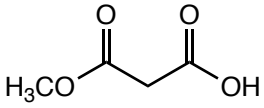


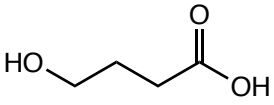
10. Label the most acidic protons in each of the following molecules, and give an estimate of their pKa values.

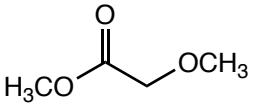


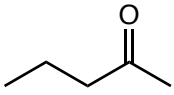


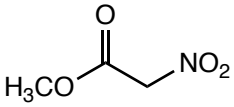


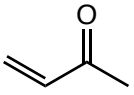












11. Identify the following compound from the given spectra.